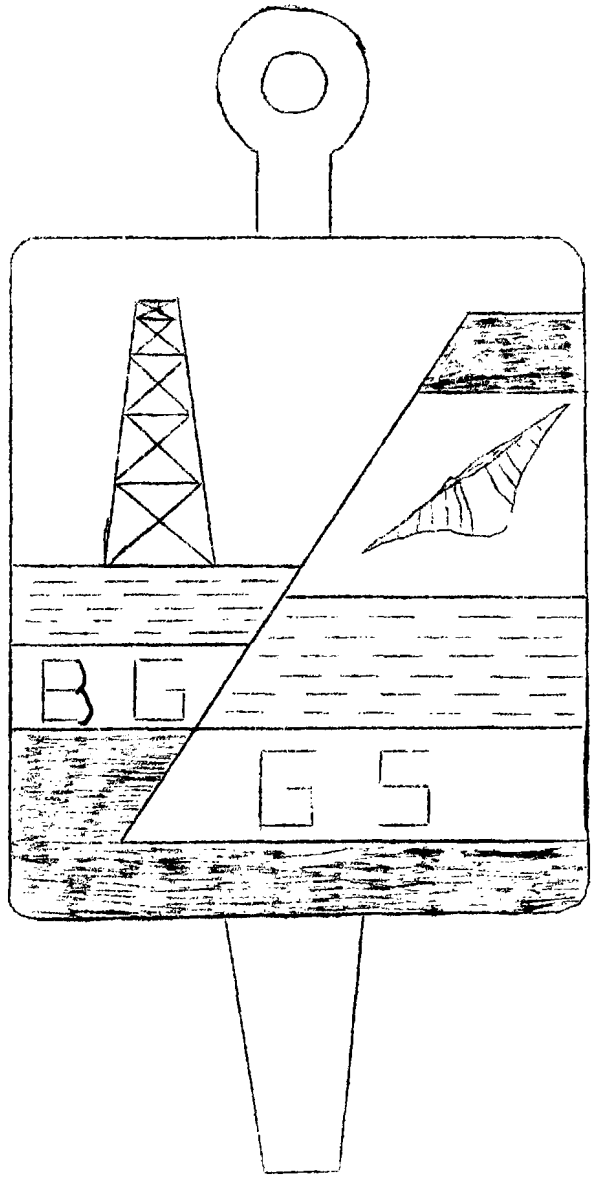
OHIO ACADEMY OF SCIENCE

BOWLING GREEN GEOLOGICAL SOCIETY

FALL FIELD TRIP - 1952



Ohio Academy of Science
Bowling Green Geological Society
Fall Field Trip - 1952

The purpose of this field trip is to offer to the geology students of other colleges and universities in Ohio an opportunity to observe in the field some of the more interesting geologic features of northwestern Ohio. The features to be seen include parts of the stratigraphic column from the Guelph formation of Niagaran age (Upper Silurian) through the disconformity between the Upper Silurian and the Middle Devonian to the Huron shale of Upper Devonian age; a cross-section of one beach ridge and the general topographic expression of several other beaches; excellent fossils from the Columbus limestone (Dundee) on both flanks of the Cincinnati Arch as well as a traverse across the axis of the Findlay branch of the Arch; and the different type of stream erosion in the weaker shale beds as compared to that in limestones and lake beds, as well as the very prominent concretions found in parts of the shale beds.

The entire trip has been planned by the students whose names appear under the various headings in the following syllabus, under the supervision of Professors Mayfield and Coash of the Department of Geology at Bowling Green State University. Other members of the Geological Society, a student organization at the university, have helped in preparations for the trip.

In most cases in the following reports references are listed. Most of the information given herein has been summarized from these references and from brief observations in the field. We are not attempting to present new data. We are simply attempting to summarize for you the information available in the literature in order to present a picture, in the field, of the geology of a portion of northwestern Ohio.

The Society wishes to thank the Ohio Academy of Science, Geology Section, for sponsering this trip, as it has sponsered other student trips in the past. We feel that these trips are invaluable to the undergraduate geology student. We are especially indebted to Dr. H. F. Kriege, Technical Director of the France Stone Company, and to Mr. Frank Huntley, a member of his staff, for a great deal of specific information concerning the various quarries and for the permission granted to visit the quarries of the company. We also wish to thank the Ohio Hydrate and Supply Company for permission to visit their quarry at Woodville.

We hope that you will feel free to ask questions and start discussions, even if we have to cut them short in order to keep up the schedule. We hope further that those who are familiar with the region, those who have worked with this geology, will feel free to comment, and that the rest of you will direct some of your questions to them also.

Fall Field Trip - 1952 - BGSU
Itinerary

Directions	Miles	Time	Remarks
Assemble at Van Buren Lake. (Guides will be posted in Van Buren - on US 25 & 68 - to direct you to the lake)		8:15	Lake Maumee beach ridge. Defiance moraine.
Leave Van Buren Lake	0.0	8:30	
Proceed west on S 113.	3.3		
Turn left on Co. 139.	.6		
Turn right to McComb's gravel pit. Park on side.	.3	8:40	STOP 1 Lake Maumee beach ridge.
Leave McComb's gravel pit		9:10	
back to Jct. Co 139 & S113	.3		
	.6		
Continue north on Co. 139 to stop sign.	2.1		CWG Note rise ahead.
Turn right on Co. 203 to JCT A 18	2.0		Lake Whittlesey beach ridge.
Turn left on S 18 through North Baltimore.	1.5		CWG Whittlesey ridge again.
Continue north to Oil Center road	1.3		
Turn right to Rudolph Rd.	.5		CWG.
Turn left to Sand Ridge Rd.	10.4	9:40	Warren beach ridge
Turn right on Sand Ridge Rd. to Maple St.	1.0		Follow beach ridge
Turn left on Maple to Wooster St.	.6		
Turn left on Wooster to Haskings Rd. (S 64)	.2		
Turn right on Haskins Rd. Continue NW.	7.9	10:00	CWG Headward erosion by small tributaries of the Maumee River. Also an exposure of clayey till.
Jct. S 64 and S 65	.8		
Turn left across river	.5		
Turn left in Waterville	.4		
Continue South, leaving S 64 to France Stone Co. quarry. Park on left side of road	1.3	10:00	STOP 2 Bowling Green fault. Tymochtee dolomite.

Leave Stop 2.		10:40	
Turn right on to US 24, back toward Waterville; turn left at JCT. S 64	1.0		CWG Former valley of
Follow S 64 to whitehouse.	6.6		Maumee River.
Turn left into quarry.		11:00	STOP 3 Columbus ls Fossil collecting
Leave Whitehouse quarry.		11:30	
Out of quarry, turn right and go through whitehouse on Lenderson St. to Weckerly Rd. Follow Weckerly Rd. (a projection of Lenderson St.) NE to Jct. US 20A	6.0		
Turn right on US 20A to Albon Road.	1.5		
Turn left on Albon Rd. to France Stone Co. quarry	1.0		
Turn right into quarry.		11:50	STOP 4 Holland quarry Dev.-Sil. contact
Leave Stop 4			
Out of quarry - turn left on Albon Rd. back to US 20A	1.0		
Turn left on US 20A into Maumee	4.2		
Turn right on US 20 and follow through town and across river	.6		
Turn right on S 270 immediately after crossing river and proceed to Ft. Meigs Monument.			
LUNCH!!	.6	12:45	Coffee and fire in the stone house.
Leave Ft. Meigs		1:45	
Go back to Rt. 20, via S 65	.2		CWG Between Perrysburg
Continue straight at stop sign, on to US 20, and follow US 20 through Perrysburg to Woodville	15.4		and Woodville, esp. at Stone Ridge, note bedrock exposures. Cross the axis of Cin. Arch. (Indefinite)
Go through Woodville, and turn right across the RR tracks to Ohio Hydrate and Supply Co. quarry.	1.0	2:15	STOP 5 Niagaran dol.
Leave Stop 5		2:45	Glacial striations may also be seen at Stop 5.

NOTE - THE REMAINING TWO STOPS ARE OPTIONAL - INTENDED FOR THOSE GOING EAST AND SOUTHEAST ANYWAY.

Back to US 20 - turn right	1.0		
Proceed to Freemont going East.	14.5		
Proceed east to Bellevue	14.0		
Turn left into France Stone Co. quarry		3:30	STOP 6 Upper and Lower Columbus ls. Fossiliferous in upper layers.
Leave Bellevue quarry		4:00	Collecting, for comparison with Stop 3.
Back to US 20 - turn left and proceed through Bellevue -			
Turn left at Jct. S 113 on east side of town.	1.7		
Follow S 113 through North Monroeville - note ridge beginning about 2 mi. out of Bellevue.			CWG beach ridge Follow the ridge
Continue east to curve in road - take gravel road straight ahead	9.4		
Turn right after .1 miles on to Peru Center Rd. Proceed 1 mile south to stop.	1.1		STOP 7 Huron shale

THIS IS THE LAST STOP - PROCEED SOUTH 2.2 MILES TO GET BACK ON TO US 20 AT MONROEVULLE.

Those going east will probably want US 20.

Those going SE will probably want Rt. 250 out of Norwalk, via Ashland.

Those going SW will probably want to take Rt. 547 out of Monroeville to Rt. 4 and then turn south through Bucyrus.

So long - and thanks for coming!

Geology - County by County

modified after Stout,
Ver Steeg, and Lamb;
Ohio Surv. Bull.,Vol.44

Hancock County

The northern part of the county lies in the area of the Lake Plain bordering Lake Erie. The county is covered partly by glacial drift and partly by lacustrine clays ranging in thickness from less than 25 feet to 100 feet. The underlying rocks are limestone and dolomite.

Wood County

Wood County lies in the glaciated, flat lake-plain area. It is traversed by beach ridges. The lake deposits and the glacial drift are generally thin, ranging from only a few feet to about 30 feet.

Lucas County

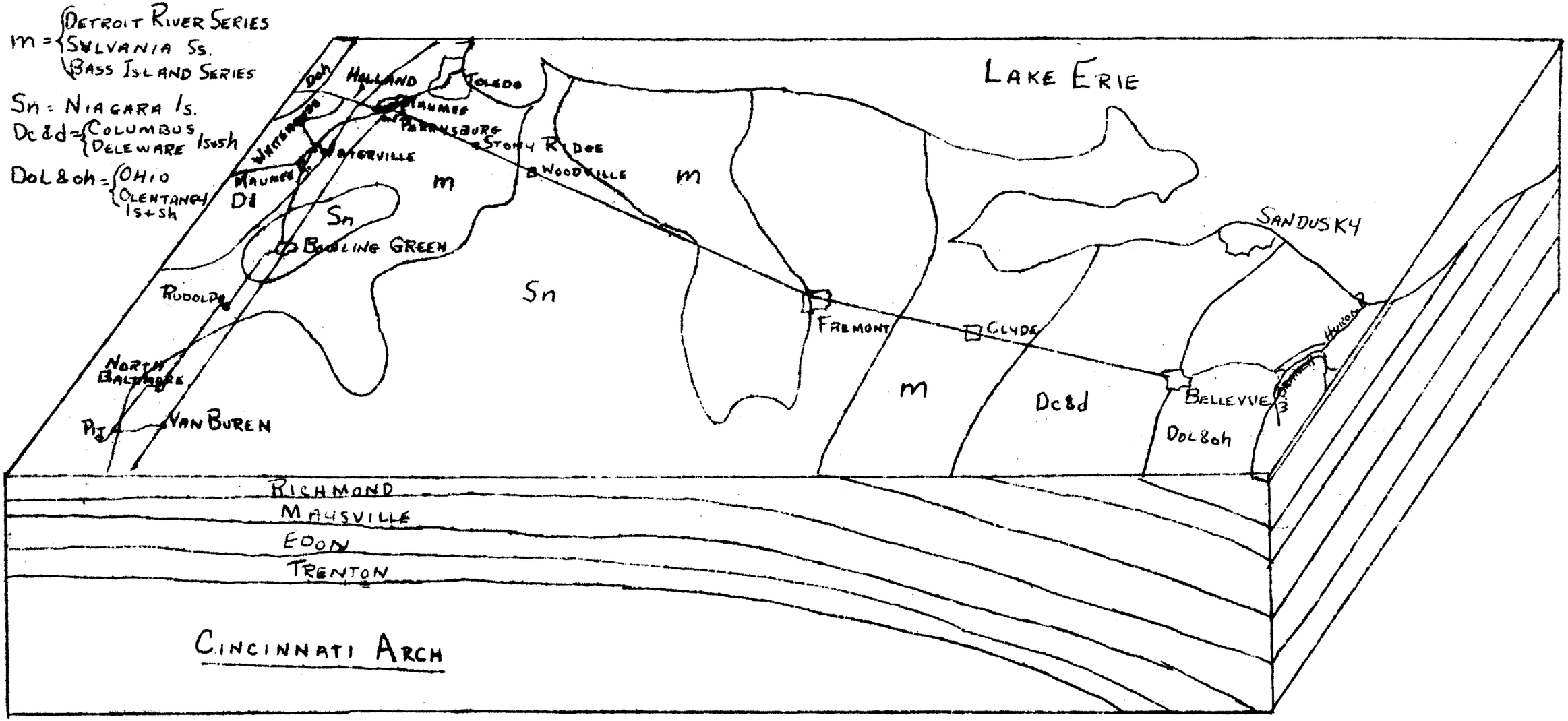
In Lucas County, an overburden of lacustrine beds and glacial till covers the bedrock surface. The thickness ranges from a few feet to about 100 feet. There are many sandy areas, with some streaks of gravel immediately above the bedrock, which consists mostly of Silurian and Devonian dolomites.

Sandusky County

This area lies within the old lake plain. The overburden of glacial drift and lacustrine beds locally attains a thickness of 60 feet.

Quadrangles Traversed

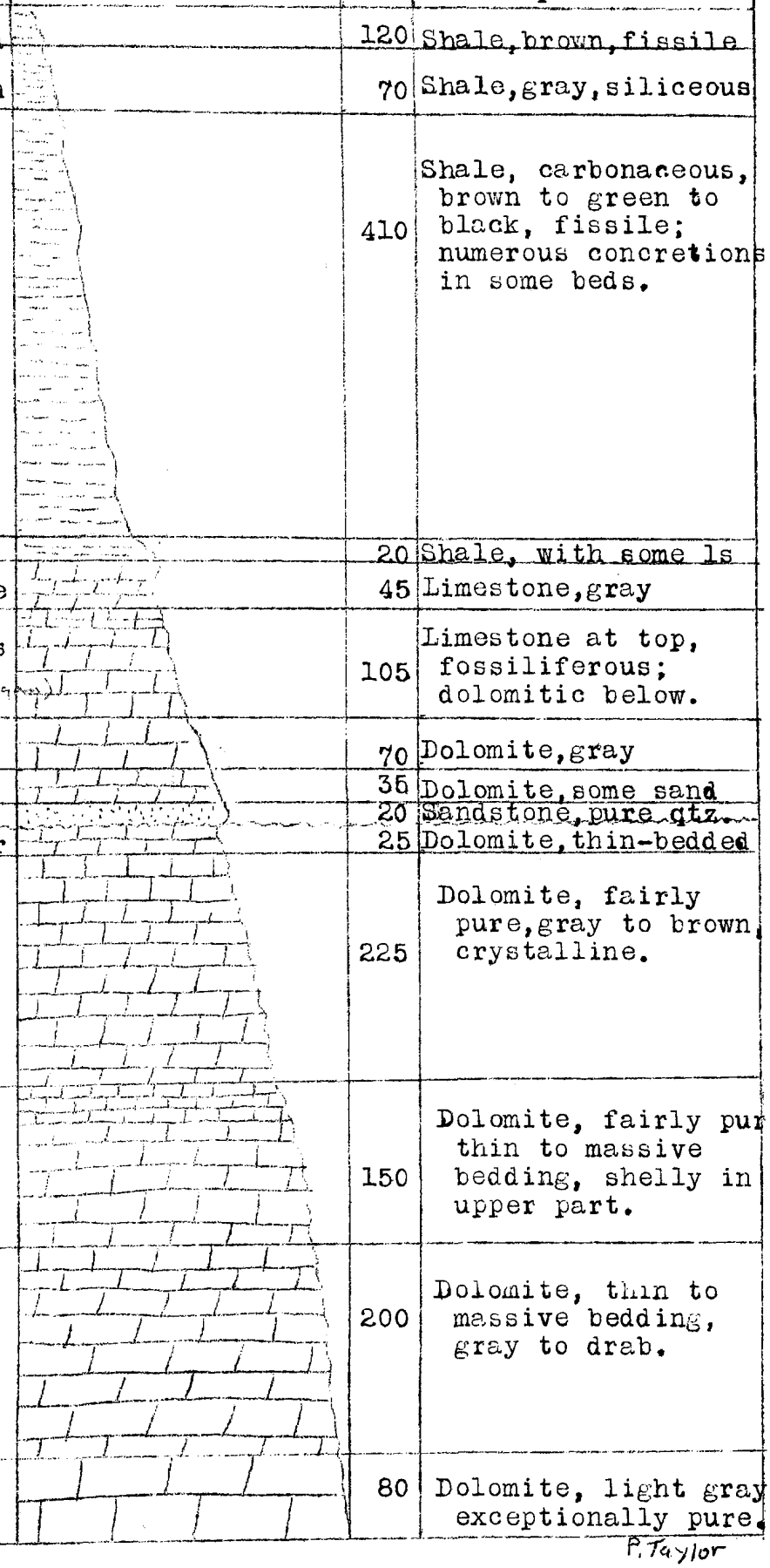
Findlay
Bowling Green
Tontogany
Swanton
Whitehouse
Maumee
Rossford
Elmore
Fremont
Bellevue
Sandusky



Block Diagram of Part of NW Ohio

K. Like

Stratigraphic Section 1/16" = 10'

Age	Group	Formation	Column	Thickness	Description
Devonian	Upper	Cleveland		120	Shale, brown, fissile
		Chagrin		70	Shale, gray, siliceous
		Ohio Huron		410	Shale, carbonaceous, brown to green to black, fissile; numerous concretions in some beds.
	Lower (Dundee)	Olentangy		20	Shale, with some ls
		Delaware		45	Limestone, gray
		Columbus		105	Limestone at top, fossiliferous; dolomitic below.
Silurian	Detroit River	Lucas		70	Dolomite, gray
		Amherstburg		35	Dolomite, some sand
		Sylvania		20	Sandstone, pure qtz.
		Raisin River		25	Dolomite, thin-bedded
	Bass Island	Put-in-Bay		225	Dolomite, fairly pure, gray to brown, crystalline.
	Salina	Tymochtee		150	Dolomite, fairly pure, thin to massive bedding, shelly in upper part.
		Greenfield		200	Dolomite, thin to massive bedding, gray to drab.
	Niagara	Guelph		80	Dolomite, light gray, exceptionally pure.

P. Taylor

Glacial Geology

David Slough

The Defiance Moraine is generally the farthest advance of the Late Cary ice sheet. Upon retreat of the ice, a series of lakes were formed between the moraine and the ice. Lake Erie represents the end member of this series. As the ice advanced and retreated different outlets were opened for the lakes which caused fluctuations in the water levelk. This caused the formation of beach ridges at different elevations. In Northwestern Ohio only the beach ridges of Lakes Maumee, Whittlesey, and Warren are prominent.

The trip begins upon the Lake Maumee beach ridge; the Defiance Moraine is visibbe to the south. At our first stop we will have a chance to examine a cross-section of the Lake Maumee beach ridge and part of the underlying Late Cary till. Upon leaving this stop we travel northward, crossing the Whittlesey and Warren beaches. Otherwise, most of the trip is made across lake plain.

References:

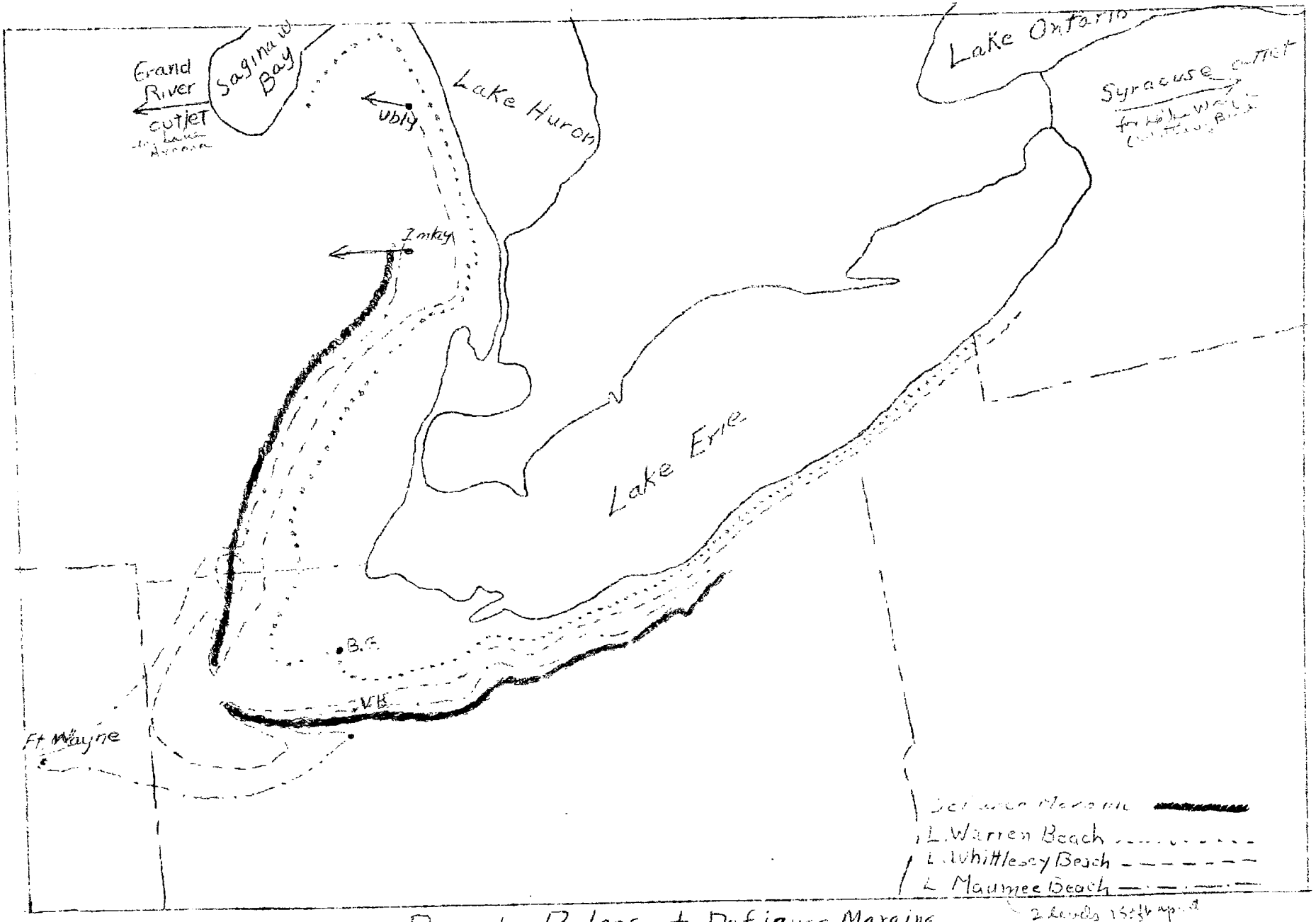
Flint, R.F., 1947
"Gbacial Geology and the Pleistocene Epoch", John Wiley & Sons, pp.253-260.

Leverett, F., 1902
"Glacial Formations and Drainage Features of the Erie and Ohio Basins", U.S.G.S. Monograph, Vol. XLI, pp.581-617,710-769.

Stout,W.,Ver Steeg, K., and Lamb, G.F.,1943
"Geology of Water in Ohio", Geol.Surv. of Ohio, 4th Ser.,Vol.44,pp.44-48.

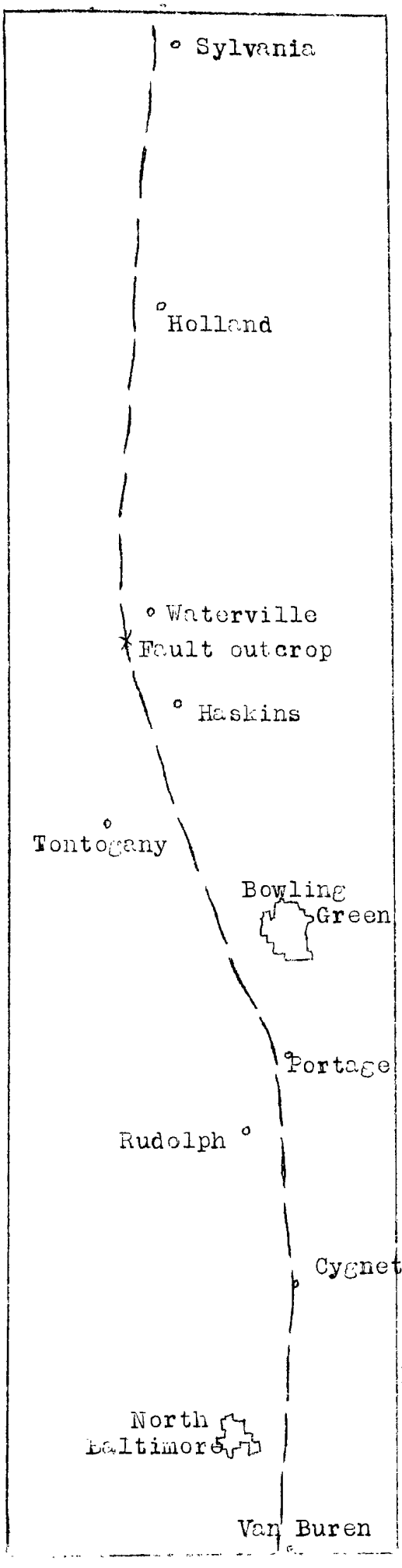
White, George, 1951
Ohio Academy of Science, 27th Annual Field Wonference, Geology Section.

LAKE	ELEV.	NATURE OF BEACH RIDGE	OUTLET
Maumee (1)	790	Prominent in N.W. Ohio	Ft. Wayne outlet through Wabash River
Maumee (2)	770-780	Prominent in N.W. Ohio	Imlay Mich. outlet to Lake Chicago
Arkona	695-710	Not prominent in N.W. Ohio	Grand River outlet to Lake Chicago
Whittlesey	720-735	Prominent in N.W. Ohio	Ubly Mich. outlet to Lake Saginaw
Wayne	645	Not prominent in N.W. Ohio	Syracuse outlet down Mohawk + Hudson R.
Warren	680	Prominent in N.W. Ohio	Grand River outlet to Lake Chicago
Lundy	620-640	Not prominent in N.W. Ohio	Syracuse outlet down Mohawk + Hudson R.
Erie	573	Present beach	Lake Ontario + St. Lawrence River



Beach Ridges + Defiance Maraine
modified after Leverett

D. S. Singh



Bowling Green Fault
Waterville Quarry

Jim Faber

The exposures of rock at the Waterville quarry and in the valley of the Maumee River nearby belong to the Tymochtee formation of the Salina Group. This formation was named in 1873 by N. H. Winchell for exposures on Tymochtee Creek in Wyandot County. The thickness of the formation ranges from 125 to 175 feet. It is composed of thin to massive beds and of considerable thin flaky material, which is mainly dolomite and not shale. Physically the rock varies from a close-grained, tough, homogeneous rock to a coarsely crystalline, porous, cavernous stone. Tymochtee stone is used mainly for crushed rock products.

The contact between the Upper and Middle Tymochtee is exposed along the Maumee River, 1½ miles southwest of Waterville. The Upper Tymochtee is relatively thin-bedded as compared to the Middle Tymochtee. In the nearby Waterville Quarry, the rock being quarried belongs to the Middle Tymochtee.

Also exposed in the same area is the Bowling Green Fault. This is the only outcrop of the fault that is known to date. The outcrop can be traced from the quarry wall, across the river bank and across the bed of the Maumee River. It is exposed as a crush zone about ten feet wide, with a trend here of approximately N 25° W and stands almost vertical.

The map at the left indicates the probable position of the fault throughout this part of Ohio. The fault can be traced from the Michigan border past Silica, Holland, and Waterville in Lucas County, to Bowling Green, Cygnet, and North Baltimore in Wood County, to Findlay and Arlington in Hancock County, to Dunkirk and Kenton in Hardin County. The maximum throw around Bowling Green is 200 feet, while at Waterville it is between 100 and 150 feet. This data was determined chiefly from well logs, and was measured on the top of the Trenton formation. The general trend of the fault is between N 06° W and N 10° W. The fault cuts diagonally across the Cincinnati Arch which trends NNE.

There is also another prominent fault situated about five miles from Carey. This fault has a general NW-SE trend, with the northwest extension pointed in the direction of the Bowling Green Fault. It seems very possible that the faults may connect, but due to the lack of drilling in the intermediate area, the only evidence to support this claim is the direction of the trends of the faults.

If the fault zone in northwestern Ohio were extended it would reach the approximate position of the cryptovolcanic structure in southwestern Ohio, near the point where Adams, Highland, and Pike counties meet. Ver Steeg says that the cause of the faulting in northwestern Ohio might be the same as for these structures in southwestern Ohio.

There is also a possibility that movements along the faults in northwestern Ohio may have occurred during the rise of the area toward isostatic equilibrium after depression by the ice sheets. This idea was proposed by Grant, and quoted by Ver Steeg.

References

Carman, J. Ernest, and Stout, Wilber, 1934
"Relationship of Accumulation of Oil to Structure and Porosity in the Lima-Indiana Field", Problems of Petroleum Geology, AAPG

Stout, Wilber, 1941
"Dolomites and Limestones of Western Ohio", Geol. Surv. of Ohio, 4th Ser., Bull. 42.

Ver Steeg, Karl, 1944
"Some Structural Features of Ohio", Jour. Geol., Vol. 52, No. 2

Whitehouse Quarry

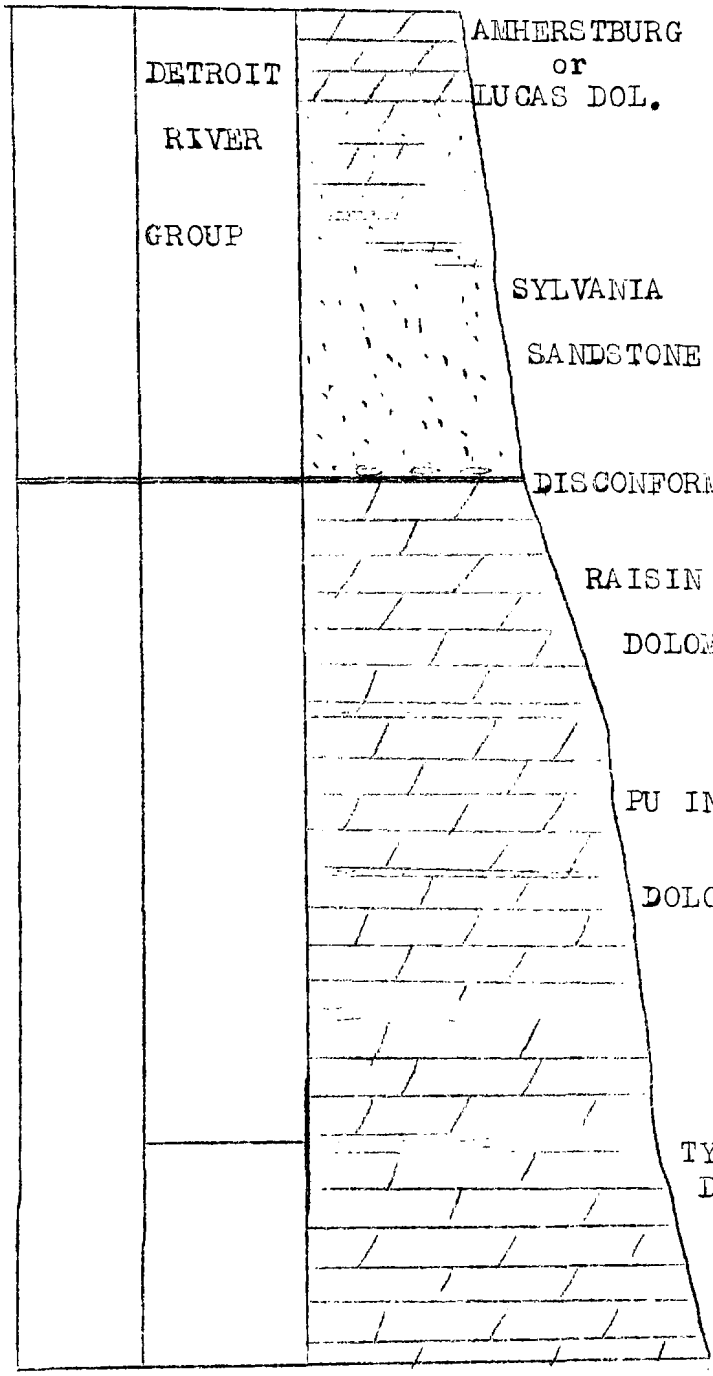
John Howe

The Dundee limestone of Middle Devonian age outcrops in a wide belt at the south edge of Detroit; from there it curves in a broad band southwestward to the vicinity of Deerfield, Michigan. Here it turns southward and narrows as it outcrops along the Lucas County monocline entering Ohio. This narrow outcrop continues until just southwest of Holland, Ohio, where the outcrop again widens.

At Whitehouse, the Dundee is much thinner than in the exposures farther to the north. According to Carman's section (in Bassett, GSA Bull.,Vol.46, pp. 438-9) only about 11 feet of Dundee are present. This section is very fossiliferous, and it is from the Dundee that we will collect on this trip. According to Carman, about 1½ feet of blue limestone, belonging to the Silica, overlie the Dundee at Whitehouse; underlying are about 33 feet of limestones which are apparently Anderdon equivalent, although not so stated. The contact below the Dundee is a disconformity, which can be seen just above the water's edge in the quarry. These limestones in turn rest upon the Lucas Dolomite in the bottom of the quarry. Carman designates the upper 11 feet as "Upper Columbus", which Bassett correlates with the Dundee. Carman designates the lower 33 feet as "Lower Columbus".

Stratigraphy of the Holland Quarry

Otis McRae



Holland lies on the flat, glaciated Lake Plain. Both the Illinoian and Wisconsin ice sheets passed over the area. Glacial grooves can be found on the bed rock on the quarry ledges on the east side.

The strata of this area are located on the northwest flank of the Findlay branch of the Cincinnati Arch. The beds dip gently to the north and west. Two geologic periods are represented in this quarry, the Devonian and the Silurian. The Bass Island and the Salina Groups make up the Upper Silurian; the Detroit River Group, the Middle Devonian. A disconformity separates the Detroit River Group from the Bass Island Group. This disconformity is evidence for an erosion interval during Lower Devonian time. The seas of this epoch were restricted to a narrow band down the Appalachian Geosyncline, and so there was no deposition in northwestern Ohio. The chief economic importance of the dolomites is for crushed rock products. The sandstone was utilized for glass making.

The strata are relatively non-fossiliferous.

Upper Silurian

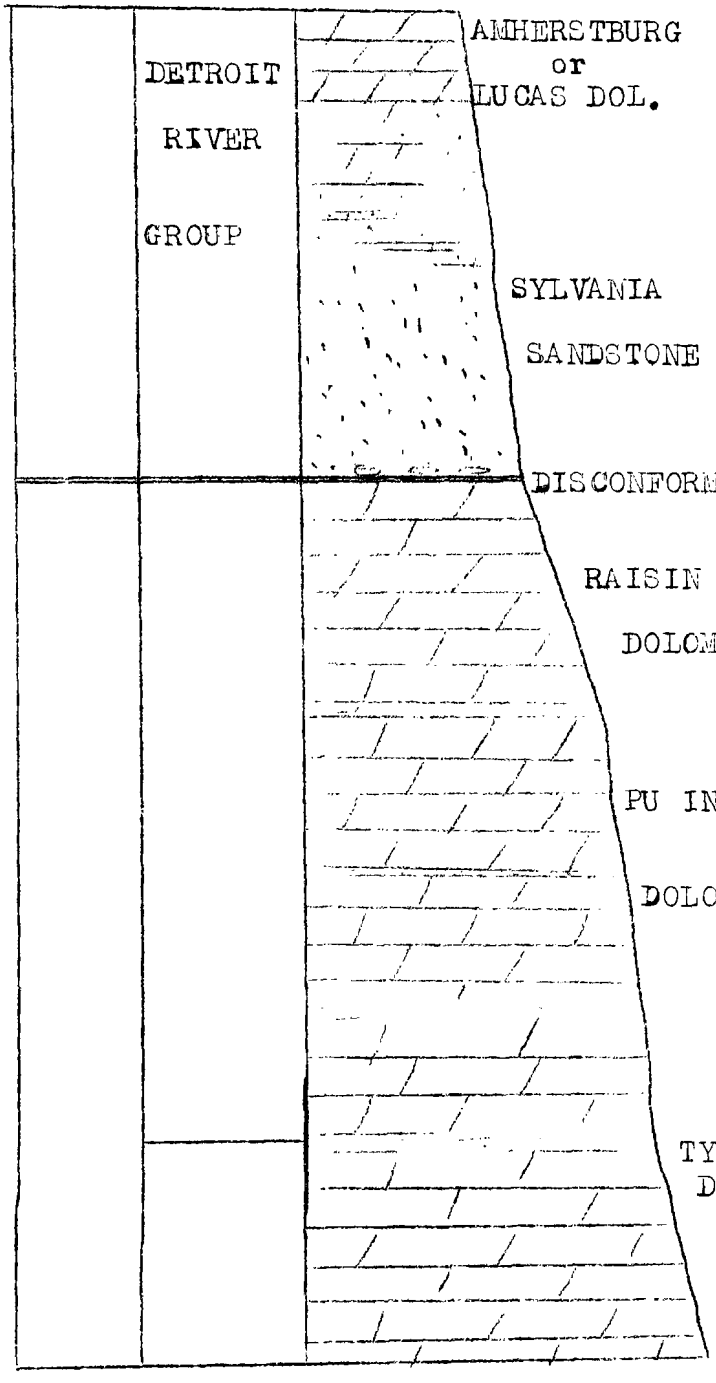
Salina Group

Tymochtee Formation

The Tymochtee has been described in some detail at the previous stop at Waterville, and so few details will be given here.

Stratigraphy of the Holland Quarry

Otis McRae



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Upper Silurian

Salina Group

Tymochtee Formation

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Bass Island Group

Put-in-Bay Dolomite

Like the Tymochtee below, the Put-in-Bay Dolomite is a dolomite of fair purity. It is gray to drab to light brown in color, crystalline and open in texture, and thin to massive in bedding. Thickness assigned varies from 5 to 250 feet.

Raisin River Dolomite

This is the highest division of the Bass Island Group. In composition the rock is a dolomite of fair purity. The color will vary from bluish gray to brownish gray. It is regularly bedded, the layers commonly being from 2 to 6 inches in thickness. Locally, however, the beds vary to more massive character. The exposure at the Holland quarry is well known.

Middle Devonian

Detroit River Group

Sylvania Sandstone

The Sylvania sandstone is a white quartz sandstone. The other Paleozoic formations of this region are mostly limestones, dolomites, or shales, and therefore, this sandstone unit attracts considerable attention. The sandstone is known only on the northwest flank of the Cincinnati Arch. All known exposures in the state are in Lucas County. The Sylvania is a very pure, friable, quartz sandstone, loosely cemented. At places cross-bedding may be seen. A basal conglomerate is present. The sand grains are well rounded, frosted and pitted; many of them exhibit secondary enlargement.

Amherstburg or Lucas dolomites

Exposed in an old part of the quarry to the west are some dolomites, sandy in parts, which may be either the Amherstburg or the Lucas dolomite.

References

Ehlers, G.M., Kesling, R.V., Rulison, J.G., Stumm,E.C., and Winston, Geo., 1952
"Stratigraphy and Structure of the Devonian Rocks in Southeastern Michigan and Northwestern Ohio", The Annual Geological Excursion of the Michigan Geological Society.

Stout, W., Ver Steeg, K., and Lamb, G.F., 1943
"Geology of Water in Ohio", Ohio Geol. Survey, 4th Ser.,Bull.44

Stout, W., 1941
"Dolomites and Limestones of Western Ohio", Ohio Geol.Surv., 4th Ser., Bull. 42

Stout, W., 1944
"Sandstones and Conglomerates in Ohio", The Ohio Jour. Sci., March, 1944

Stout, W., 1944
"Dolomites", The Ohio Jour. Sci., September, 1944

Area Between Perrysburg and Woodville

Ken Like

During this part of the trip we will cross the rather indefinite axis of the Findlay branch of the Cincinnati Arch. Bedrock is very close to the surface and is exposed at several points along US 20. The exposures are especially noticeable at Lime City and Stony Ridge, where topographic highs exist, flanked by shallow valleys.

Topography near Bellevue

Ken Like

Approaching Bellevue, a hummocky topography is encountered in the form of dunes and sandy deposits. This area represents the remnants of the Lake Maumee beach, but due to wind erosion and Karst topography development, the area has been considerably modified. The Lake Maumee beach curves to the southeast from here, and Bellevue proper lies on the Lake Maumee plain.

Just east of Bellevue, on S 113, the Lake Whittlesey beach ridge is encountered. Route 113 follows the beach ridge rather closely as far as North Monroeville. From here on the caravan returns to the lake plain.

References

Dougherty, Ruth, 1941
"The Geography of the Bellevue Area", Ohio Jour. Sci., Vol.XLI, No. 5, pp. 366-367.

Leverett, Frank, 1902
"Glacial Formations and Drainage Features of the Erie and Ohio Basins", U.S.G.S. Monograph, Vol. XLI, pp.730-731 and Pl. XI.

Woodville Quarry
Guelph Formation

Max Hemminger

At the quarry of the Ohio Hydrate and Lime Company, the oldest rocks of the trip are exposed. Only one formation is represented here, the Guelph dolomite of the Niagaran group of Upper Silurian age.

We are now on the eastern flank of the Findlay branch of the Cincinnati Arch, as indicated by the gentle dip to the east which can be seen in the quarry.

In the Guelph formation crystals of calcite, celestite, fluorite, pyrite, and siderite may be found. A very large vug containing excellent crystals, especially of celestite has been opened in the Ohio Lime Products quarry on the northwest side of town; unfortunately the vug is now inaccessible.

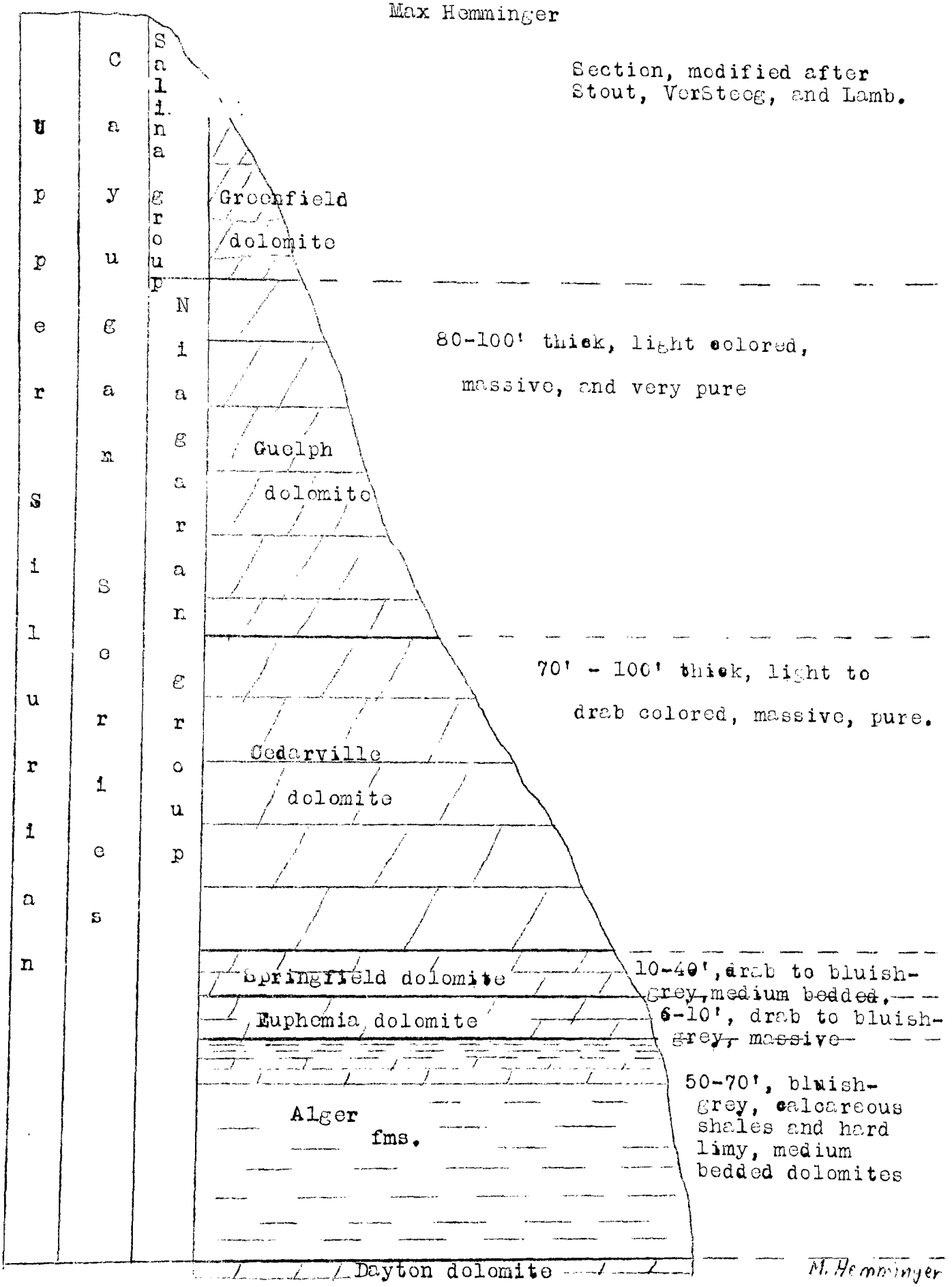
Fossils are comparatively scarce in this formation, but brachiopods, corals, and cephalopods, and especially some large pelecypods may be found. Most of these are represented by interior casts and only rarely does one find any actual replacement of the shell.

This formation is exceedingly pure dolomite, averaging almost 98% $CaMgCO_3$. Impurities, especially iron, are very lost. Much of this rock is hydrated and sold for use as "white wall" finishing plaster, but a great deal is used in the glass and steel industries as a flux. Much of it is used locally for road beds.

Erosion has carved the surface here, reducing the beds to their present thickness. Glacial erosion has been active and a polished surface, covered with striations and grooves is exposed by quarrying operations. Those interested may drive on to the rim of the quarry in order to observe these features. Of special interest are the presence of two sets of striations with different directions.

Niagaran Group

Max Hemminger



Section, modified after Stout, VerSteeg, and Lamb.

M. Hemminger

Bellevue Quarry
Columbus ls

Alan Howitt

At the Bellevue quarry of the France Stone Company, we return to the Columbus formation. Here again we find the upper, fossiliferous portion, and the lower, non-fossiliferous portion of the section. It may be of interest to the fossil collectors to make comparisons between the collections made here and those made at the Whitehouse quarry, Stop 3 on today's trip. Another feature of interest here is the presence of chert stringers in the beds below the fossiliferous layers. The stringers may be observed to thin out to the west.

Devonian Correlations

Correlation of Devonian strata has been under considerable discussion during the past few years especially. In northwestern Ohio, workers are torn between the new correlations being made from Michigan southward and the older correlations which were made in large part from Ohio northwestward. This is particularly true of the Dundee and Columbus formations. Early mis-correlations have further complicated the picture. Apparently differences exist on the east and west sides of the Cincinnati Arch. We have not attempted to resolve any of these problems. Use of the name Dundee seems advisable in the Whitehouse area, on the basis of r ecent crrelations by Ehlers, et al. Use of the name Columbus may still be advisable at Bellevue. We wish mainly to point out the problem, and especially to provide an opportunity to observe both sections and collect a few fossils from each.

Huron Shale

Paul Taylor

The first description of the Huron shale was made by Dr. Newberry in the Huron River Valley, after which the shale was named. Dr. Newberry first published the name Huron shale in 1870, and stated that "its outcrop forms a belt from ten to twenty miles in width, reaching from the Lake shore at the mouth of the Huron River, almost directly south to the mouth of the Scioto".

Charles Prosser's paper, "The Huron and Cleveland Shales of Northern Ohio", was published in The American Journal of Science. In this paper, Prosser divides the Huron shale into zones of varying thickness, composition, and color.

In the GSA correlation chart for the Devonian, it is stated that the name Huron shale has been used rather loosely for various exposures of black shales in this general section of the country. General agreement with Prosser's interpretation is expressed, and the Huron shale is regarded as a black shale facies of the gray Chagrin farther to the east. The Huron shale is regarded as the upper limit of the Devonian. The Huron is considered here as a member of the Ohio shale.

At Stop 7, between North Monroeville and Milan, on the West Branch of the Huron River, Zones 7 and 6 are evidently exposed. Here we see, for the most part, a black, fissile, carbonaceous shale, approximately 30 feet thick, containing large, spherical, calcareous concretions, small disk-like marcasite concretions, and a few septaria.

The deep valley cut in the shales is rather interesting in contrast with the shallow valleys noted earlier in limestones. The relation of curves in the stream and the two intersecting sets of joint planes is apparent upon observation.

References

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